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(71) Applicant *(for all designated States except US)*: **BOREALIS TECHNICAL LIMITED** [GB/US]; 23545 NW Skyline Blvd, North Plains, OR 97133-9205 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **TAVKHELIDZE, Avto** [GE/GE]; Suite 3G, Eurolife Building, 1 Corral Road, Gibraltar (GI). **HARBRON, Stuart** [GB/GB]; Suite 3G, Eurolife Building, 1 Corral Road, Gibraltar (GI).

(74) Agent: **BOREALIS TECHNICAL LIMITED**; COX, Rodney, T., 23545 NW Skyline Blvd, North Plains, OR 97133-9205 (US).

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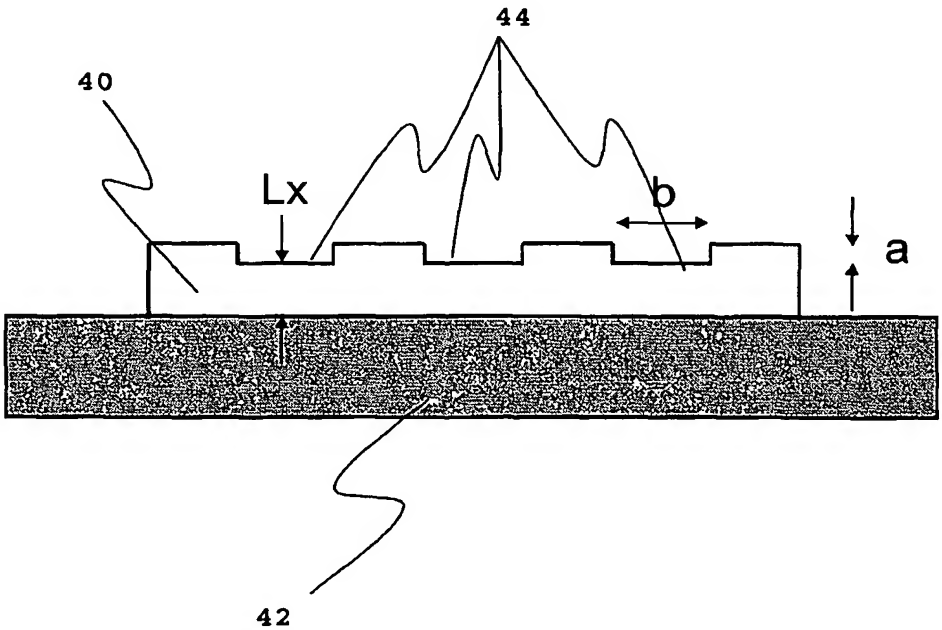
[Continued on next page]

(54) Title: INFLUENCE OF SURFACE GEOMETRY ON METAL PROPERTIES



(57) Abstract: The influence of surface geometry on metal properties is studied within the limit of the quantum theory of free electrons. It is shown that a metal surface can be modified with patterned indents to increase the Fermi energy level inside the metal, leading to decrease in electron work function. This effect would exist in any quantum system comprising fermions inside a potential energy box. Also disclosed is a method for making nanostructured surfaces having perpendicular features with sharp edges.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/08907

A. CLASSIFICATION OF SUBJECT MATTER

. IPC(7) : C25F 3/02; G11B 7/26

. US CL : 216/11, 40, 54, 66, 67; 430/321, 9, 11

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 216/11, 40, 54, 66, 67; 430/321, 9, 11

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6117344 A (COX et al) 12 September 2000 (12.09.2000), column 3, lines 46-58, column 4, lines 2-5, column 6, lines 26-40.	1-16
A	US 5,503,963 A (BIFANO) 2 April 1996 (02.04.1996), column 4, lines 27-30.	1-16
A	US 6,281,514 A (TAVKHELIDZE) 28 August 2001 (28.08.2001).	
A	US 5,068,535 A (RABALAIS) 26 November 1991 (26.11.1991).	

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"B" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
06 September 2003 (06.09.2003)	02 OCT 2003
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703)305-3230	Authorized officer Cathy Lam Telephone No. (703) 308-0661 DEBORAH THOMAS LEGAL SPECIALIST

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US03/08907

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1-16

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

PCT/US03/08907

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-16, drawn to a metal slab.

Group II, claim(s) 17-26, drawn to a method of creating indents on a plane slab.

Group III, claim(s) 27-40, drawn to a method of fabricating an electrode pair precursor.

Group IV, claim(s) 41-53, drawn to an electrode pair precursor.

The inventions listed as Groups I-IV do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: group I is directed to a plane metal slab having indent(s); group II is directed to forming idents on a meal plane slab by using EM radiation, e-beam or ion beam; group III is directed to a method of fabricating an electrode pair precursor by etching; and group IV is directed to an electrode pair precursor.